

## ENGINEERING DESIGN OF THE LUX PHOTOINJECTOR\*

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Abstract text:

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The photoinjector for the LBNL LUX project, a femtosecond-regime X-ray source, is a room-temperature 1.3 GHz 4 cell structure producing a 10 MeV, nominal 30 psec, 1 nanocoulomb electron bunch at a 10 kHz rate. The first cell is of reentrant geometry, with a peak field of 64 MV/m at the photocathode surface, the geometry of which will be optimized for minimum beam emittance. The high repetition rate and high peak power results in a high average surface power density. The design of the cavity, its cooling structure and power couplers, is coordinated with the configuration of the RF system, including a short, high-power driving pulse and active removal of stored energy after the beam pulse to reduce the average power dissipated in the cavity. An RF and thermal analysis of the photoinjector will be presented, along with plans for a high average and peak power test of the first cell.

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